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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/822,755	04/13/2004	Katsuhiko Tsuno	Q81047	2812
23373	7590	09/19/2005	EXAMINER	
SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037			AMARI, ALESSANDRO V	
			ART UNIT	PAPER NUMBER
			2872	

DATE MAILED: 09/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/822,755

Applicant(s)

TSUNO ET AL.

Examiner

Alessandro V. Amari

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-5/1, 9-18/1 is/are rejected.
- 7) ☒ Claim(s) 3-20/2, 6-8/1 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 August 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
- Paper No(s)/Mail Date 4/13/2004.

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings were received on 25 August 2004. These drawings are accepted.

Specification

2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: the specification fails to provide proper antecedent basis for the recitation in claim 18 that "said optical device is exclusively made of said particle dispersed silicon material".

Claim Objections

3. Claims 18, 19 and 20 are objected to because of the following informalities:

Regarding claim 18, the phrase, "said optical device is made exclusively of said particle dispersed silicon material" is confusing and ambiguous since claim 9, from which claim 18 depends recites that a reflecting film is provided on said mirror finish of the mirror substrate and the reflecting film is not composed of a particle dispersed silicon material.

Regarding claims 19 and 20, the phrase, "said detector" has no prior mention in previous claims.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 5, 9-11, 13 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroyoshi JP 2003-057419 in view of Murakami et al US 6,441,963.

In regard to claim 1, Hiroyoshi teaches (see Figures 1, 2) a mirror substrate (11), wherein the substrate is made of a particle-dispersed silicon material composed of silicon carbide and silicon as described in paragraphs 0018 and 0024. Regarding claim 5, Hiroyoshi teaches that said mirror is planar as shown in Figures 1 and 2. Regarding claims 9, 10 and 11, Hiroyoshi teaches (see Figures 1, 2) a reflecting film (13) provided on said mirror finished polished surface of the mirror substrate made of a metal wherein said metal is aluminum as described in paragraphs 0018 and 0019. Regarding claim 13, Hiroyoshi teaches that the mirror body is employed as a reflecting mirror as described in paragraph 0018. Regarding claim 18, Hiroyoshi teaches that said optical device is exclusively made of said particle dispersed silicon material composed of silicon carbide and silicon as described in paragraphs 0018 and 0024.

However, in regard to claim 1, Hiroyoshi does not teach that the surface of said substrate to be used as a reflecting surface is polished to mirror finish.

In regard to claim 1, Murakami et al teaches that a substrate to be used as a reflecting surface is polished to a mirror finish as described in column 12, lines 17-20 and 58-64.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to polish the substrate of Hiroyoshi to a mirror finish as taught by

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Murakami et al to reduce interface roughness in order to provide for a mirror of high reflectivity for optical applications.

6. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroyoshi JP 2003-057419 in view of Murakami et al US 6,441,963.

Regarding claims 3 and 4, Hiroyoshi in view of Murakami et al teaches the invention as set forth above but in regard to claim 3 does not teach that said mirror is concave or in regard to claim 4 that said mirror is convex. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the mirror be concave or convex, since it has been held that a mere change in shape of an element is generally recognized as being within the level of ordinary skill in the art when the change in shape is not significant to the function of the combination. Further, one would have been motivated to select the concave or convex shape for the mirror of Hiroyoshi in view of Murakami et al for the purpose of providing a more suitable mirror surface applicable to the optical application desired (i.e., focusing or deflecting). *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroyoshi JP 2003-057419 in view of Murakami et al US 6,441,963 and further in view of Kimock et al US 5,637,353.

Regarding claim 12, Hiroyoshi in view of Murakami et al teaches the invention as set forth above but in regard to claim 12, does not teach that said reflecting film is made of a multilayer dielectric film.

Regarding claim 12, Kimock et al teaches that said reflecting film is made of a multilayer dielectric film as described in column 10, lines 26-35.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the multilayer dielectric film as taught by Kimock et al for the mirror of Hiroyoshi in view of Murakami et al in order to produce wavelength selective mirrors.

8. Claims 14 and 16, 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroyoshi JP 2003-057419 in view of Murakami et al US 6,441,963 and further in view of Beach US 5,995,280.

Regarding claims 14, 16, 17 and 19, Hiroyoshi in view of Murakami et al teaches the invention as set forth above but regarding claim 14, does not teach that said optical device is a reflecting telescope or regarding claim 16, that the optical device comprises a mirror reflecting the incident light beam and thereafter focusing the incident light beam on a detector or regarding claim 17, that the optical device comprises a first mirror for reflecting the incident light beam and thereafter focusing the light beam on a second mirror and the second mirror reflecting said focused light beam and thereafter focusing the light beam on a detector or regarding claim 19, that said detector is an image sensor.

Regarding claim 14, Beach does teach (see Figures 4, 5) that said optical device is a reflecting telescope as described in the abstract. Regarding claim 16, Beach teaches (see Figures 4, 5) that the optical device comprises a mirror (37, 52) reflecting the incident light beam and thereafter focusing the incident light beam on a detector as

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described in column 9, lines 65-67. Regarding claim 17, Beach teaches (see Figures 4, 5) that the optical device comprises a first mirror (31, 51) for reflecting the incident light beam and thereafter focusing the light beam on a second mirror (37, 52) and the second mirror reflecting said focused light beam and thereafter focusing the light beam on a detector as described in column 9, lines 65-67. Regarding claim 19, Beach teaches that said detector is an image sensor as described in column 9, lines 65-67.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the mirror body of Hiroyoshi in view of Murakami et al in the telescope of Beach in order to provide for a telescope that has reflecting optics that have superior thermal stability, thus reducing optical distortions and producing superior images.

9. Claims 15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroyoshi JP 2003-057419 in view of Murakami et al US 6,441,963 and further in view of Arimoto US 5,465,170.

Regarding claims 15 and 20, Hiroyoshi in view of Murakami et al teaches the invention as set forth above but regarding claim 15 does not teach that the optical device is a reflecting communication antenna or in regard to claim 20 that a detector is a photodetector.

Regarding claim 15, Arimoto teaches (see Fig. 1) that the optical device is a reflecting communication antenna as described in column 5, lines 59-68 and column 6, lines 1-50. Regarding claim 20, Arimoto teaches (see Figure 1) that the detector is a photodetector (34).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the mirror body of Hiroyoshi in view of Murakami et al in the antenna of Arimoto in order to provide for a antenna that has reflecting optics that have superior thermal stability, thus reducing optical distortions and producing superior transmission/reception.

Allowable Subject Matter

10. Claims 3-20 depending from claim 2 and 6-8 depending on claim 1 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. Claim 2 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "Vickers hardness thereof is 1,500 Hv or more, the 3 point bending hardness is 500Mpa or more, and the thermal conductivity thereof is 100 W/mK or more" as set forth in the claimed combination. Claims 3-20 are also allowable based upon their dependence on claim 2.

Claim 6 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "wherein the maximum diameter of concavities and convexities or pores on the surface of the mirror is 40nm or less" as set forth in the claimed combination. Claims 7 and 8 are also allowable based upon their dependence on claim 6.

The prior art of record teaches a mirror substrate, wherein the substrate is made of a particle-dispersed silicon material composed of silicon carbide and silicon, and the

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surface of said substrate to be used as a reflecting surface is polished to mirror finish.

However, the prior art of record does not teach the characteristics regarding Vicker's hardness, 3 point bending hardness and thermal conductivity or that the maximum diameter of concavities and convexities or pores on the surface of the mirror is 40nm or less and there is no motivation or teaching to modify this difference as derived.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Waggoner et al teaches a mirror substrate wherein the substrate is made of a particle-dispersed silicon material comprising silicon carbide and silicon as described in column 16, lines 52-62.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alessandro V. Amari whose telephone number is (571) 272-2306. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on (571) 272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ava:114
15 September 2005

Alessandro Amari
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Examiner AU2872